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Evaluation # 200418-W Revised (Replaces 980053-W)

Safety & Buildings Division
201 West Washington Avenue
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Madison, WI 53701-2658

Wisconsin Building Products Evaluation

Material	Microllam® Laminated Veneer Lumber (LVL)
Manufacturer	Trus Joist, A Weyerhaeuser Business PO Box 8449 Boise, ID 83707

SCOPE OF EVALUATION

GENERAL: This report evaluates the use of Microllam® laminated veneer lumber (LVL), manufactured by Trus Joist, A Weyerhaeuser Business, for use as structural lumber (engineered).

Comm requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1 & 2 fanily dwellings:**

- **Structural:** The Microllam LVL was evaluated for use in dry locations, and not limited to beams, headers, joists, rafters, columns, studs, rim board, components in built-up structural members such as flanges for I-Joists, chords for trusses and laminations for glued-laminated members in accordance with **s. Comm 21.02(3)(a)2.** and **s. Comm 21.19.**

The **IBC** requirements below in accordance with the current **Wisconsin Amended ICC Code:**

- **Structural:** The Microllam LVL was evaluated for use in dry locations, and not limited to beams, headers, joists, rafters, columns, studs, rim board, components in built-up structural members such as flanges for I-Joists, chords for trusses and laminations for glued-laminated members in accordance with **ss. IBC 2301.2, 2301.2.1, 2303.1** and **2301.6.1.**

DESCRIPTION AND USE

Microllam LVL is manufactured from veneers of a single wood species, or species combinations and adhesives meeting the requirements specified in the approved quality control manual and manufacturing standard prepared by Trus Joist. During manufacture, the veneers are placed in a continuous-feed press, with all grain oriented parallel to the length of the member, and the veneers are bonded together with the approved adhesives, complying with the durability requirements of ASTM D2559. Microllam LVL is available in thickness from ¾-inch to 3-1/2 inches, depths from 2-1/2 inches to 48 inches, and lengths up to 80 feet.

Standard veneer grading is accomplished with an ultrasonic process with a visual override as described in the manufacturing standards. The advanced grading system (AGS) employs the use of density verification equipment in addition to the standard veneer grading system.

The design provisions for sawn lumber ANSI/AF&PA NDS-97, *National Design Specification for Wood Construction* are applicable to Microllam LVL, unless otherwise noted within this approval. Allowable design stresses for dry conditions of use are noted in Table No. 1, and may be adjusted for duration of load and repetitive member use in accordance with the provisions in **IBC Chapter 23**, unless otherwise noted in the footnotes to Table 1.

Lateral nail-holding and withdrawal values, installed parallel or perpendicular to the wide face of Microllam LVL are equivalent to that in the NDS-97 for Douglas fir-larch (S.G. = 0.05). Spacing of nails installed perpendicular to the glue lines on the wide face of the Microllam LVL products are the same as those provided in Part 11 of the ANSI/AF&PA NDS-97 for sawn lumber. Spacing of nails and staples installed parallel to the glue lines on the narrow face of the material is limited as shown in Table 2.

Allowable lateral loads for machine bolts installed perpendicular to the wide face of Microllam LVL (perpendicular to the glue lines), with loads applied parallel or perpendicular to the grain of the wood veneers, are the same as those provided in the NDS-97 for sawn lumber with a minimum specific gravity of 0.50, such as for Douglas fir-larch. Specific approval is required for nail and bolt connections not noted herein.

TESTS AND RESULTS

Mechanical property tests were performed in accordance with ASTM D5456. Allowable design values were assigned in accordance with ASTM D4556 and other appropriate standards.

All mechanical property testing was conducted and/or witnessed by independent test laboratories or third party inspection agencies (PFS). Test data and results are on file with the department. Trus Joist's Quality Control Manual is on file with the department.

Table 1. Microllam (LVL) Framing Lumber Design Stresses [1, 2, 3]
(pounds per square inch)

Billet Material Thickness	GRADE SPECIES[1]	AXIAL		JOIST/BEAM				PLANK		
		F_t[4]	F_C	F_b[5, 6]	F_V[7]	MOE ($x10^6$)	$F_{C\perp}$[8]	F_b[9]	F_V	$F_{C\perp}$[8]
3/4 inch to 3-1/2 inch	1.6 DF/LP/WH	1240	2100	2140	285	1.6	750	2530	190	480
	1.8 DF/LP/WH	1450	2375	2445	285	1.8	750	2890	190	480
	1.9 DF/LP/WH	1555	2510	2600	285	1.9	750	3075	190	480
	2.0 DF/LP/WH	1660	2635	2750	285	2.0	750	3255	190	480
	2.0 DF/LP/WH[10]	1660	2635	2900	285	2.0	750	3430	190	480
	2.2 DF/LP/WH	1865	2870	3060	285	2.2	750	3615	190	480
	2.4 DF/LP/WH	2075	3080	3365	285	2.4	750	3980	190	480
	2.6 DF/LP/WH	2285	3270	3675	285	2.6	750	4345	190	480
3/4 inch to 3-1/2 inch	1.8 SP	1575	2375	2445	285	1.8	880	2890	190	525
	1.9 SP	1690	2510	2600	285	1.9	880	3075	190	525
	2.0 SP	1805	2635	2750	285	2.0	880	3255	190	525
	2.2 SP	2030	2870	3060	285	2.2	880	3615	190	525
	2.4 SP	2260	3080	3365	285	2.4	880	3980	190	525
	2.6 SP	2485	3270	3675	285	2.6	880	4345	190	525
3/4 inch to 3-1/2 inch	1.6 YP	1350	2100	2140	285	1.6	880	2530	190	670
	1.8 YP	1575	2375	2445	285	1.8	880	2890	190	670
	1.9 YP	1690	2510	2600	285	1.9	880	3075	190	670
	2.0 YP	1805	2635	2750	285	2.0	880	3255	190	670

	2.2 YP	2030	2870	3060	285	2.2	880	3615	190	670
3/4 inch to 1-3/4 inch	2.0E - 2925F_b SP[9]	1805	3030	2925	285	2.0	880	3455	190	525

Notes:

1. Allowable stresses are based on covered, dry conditions of use. Dry conditions of use are those environmental conditions represented by sawn lumber at which the moisture content is less than 16%.
2. For uniformly loaded, simple span beams, deflection is calculated as follows:

$$\Delta = \frac{270WL^4}{Ebd^3} + \frac{288WL^2}{Ebd}$$

where: W = Uniform load, plf; Δ = Deflection, inches; L = Span, feet; b = Beam width, inches; d = Beam depth, inches; E = Modulus of Elasticity, psi

3. DF = Douglas fir-larch; LP = Lodgepole Pine; WH= Western Hemlock ; SP= Southern Pine ; YP = Yellow Poplar. DF, LP and WH are permitted to be combined as Western Species (WS). SP, and YP are permitted to be combined as Eastern Species (ES). When using the species groups WS or ES, the allowable stresses shall be the lower values for the species in the group.
4. The Ft values in the Table are reduced to reflect the volume effects of length, width and thickness for a range of common application conditions. Therefore the Ft values in the Table do not apply to Microllam LVL when used as a component of engineered products manufactured by Trus Joist which are listed in other evaluation reports.
5. Fb includes allowances for variations in span to depth ratio and method of loading and must be used without further adjustment except as noted below. For depths other than 12 inches, regardless of thickness, table values shall be multiplied by $(12/d)^{0.136}$. Adjustments for common depths are:

Depth	3.5	5.5	7.25	9.25	12	16	20	24
Multiplier	1.18	1.11	1.07	1.04	1.00	0.96	0.93	0.91

For depths less than 3.5 inches, the factor for the 3.5-inch depth must be used.

6. When structural members qualify as repetitive members in accordance with the building codes, a four percent increase is permitted, in addition to the increases permitted in Footnote 4. This increase does not apply to field assembled multi-member beams.
7. For simplicity, use 285 psi for depths up to 24-inches and 260 psi for depths greater than 24-inches. When a more accurate analysis is desired, the allowable horizontal shear for all depths greater than 12-inches is $F_v=285\ (12/d)^{0.065}$.
8. $F_{c\perp}$ shall not be increased for duration of load for beams.
9. Values shown are for thickness up to 3.5 inches.
10. Used in header or beam applications only.

TABLE 2 – SPACING OF NAILS AND STAPLES IN Microllam® LVL

Microllam LVL Dimensions	FASTENER (Installed parallel to glue lines on the narrow face of the material)	MINIMUM SPACING (inches)
Minimum ¾ inch thick and 3-1/2 inches deep	8d nail	3
	10d nail	4
	12d nail	4
	No. 14 gage staple	4
Minimum 1-1/2 inch thick and 3-1/2 inches deep	10d nail	4
	12d nail	4
	16d nail	8
	No. 14 gage staple	4

LIMITATIONS OF APPROVAL

General: This evaluation number permits the use of allowable design stresses as specified. It does not take the place of structural calculations for assemblies made of Microllam® laminated veneer lumber (LVL), when required by **Chapters Comm 20-25** or **IBC Chapter 23**. Applications not covered by this approval and requiring special considerations may be handled by contacting a Trus Joist representative for guidance and submitted for review when required by **Chapters Comm 20-25** or **IBC Chapter 23**.

The **IBC** limitations below are in accordance with the current **Wisconsin Amended ICC Code:**

Installation: Microllam® laminated veneer lumber (LVL) shall be installed in accordance with this evaluation report and applicable building codes, the specifications of the design professional responsible for the design of the structure and, in lieu of a project designer, the latest edition of Trus Joist's installation guidelines. Trus Joist's guidelines are general

recommendations only and shall be superceded by any and all details specified by the design professional responsible for the design of the structure. Structural calculations, drawings, specifications, and/or Trus Joist's installation guidelines shall be made available to the code official in accordance with **s. Comm 20.09(4)** and **s. Comm 61.30** of the current **Uniform Dwelling Code** and **Wisconsin Amended ICC Code**, respectfully.

Identification: Microllam® laminated veneer lumber (LVL) shall be identified with markings noting the manufacturer's name and/or trademark, plant number, product description, grade, model code acceptance identification and third party inspection agency name and/or trademark as required by **ss. Comm 20.18** or **61.60** of the current **Uniform Dwelling Code** and **Wisconsin Amended ICC Code**, respectfully.

This approval will be valid through December 31, 2009, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date: July 20, 2004
Approval Date: July 13, 2004 By: _____

Lee E. Finley, Jr.
Product & Material Review
Integrated Services Bureau

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